Victorian 6502 User Group Newsletter

KAOS

For People Who Have Got Smart

OSI SYM KIM AIM UK101 RABBLE 65

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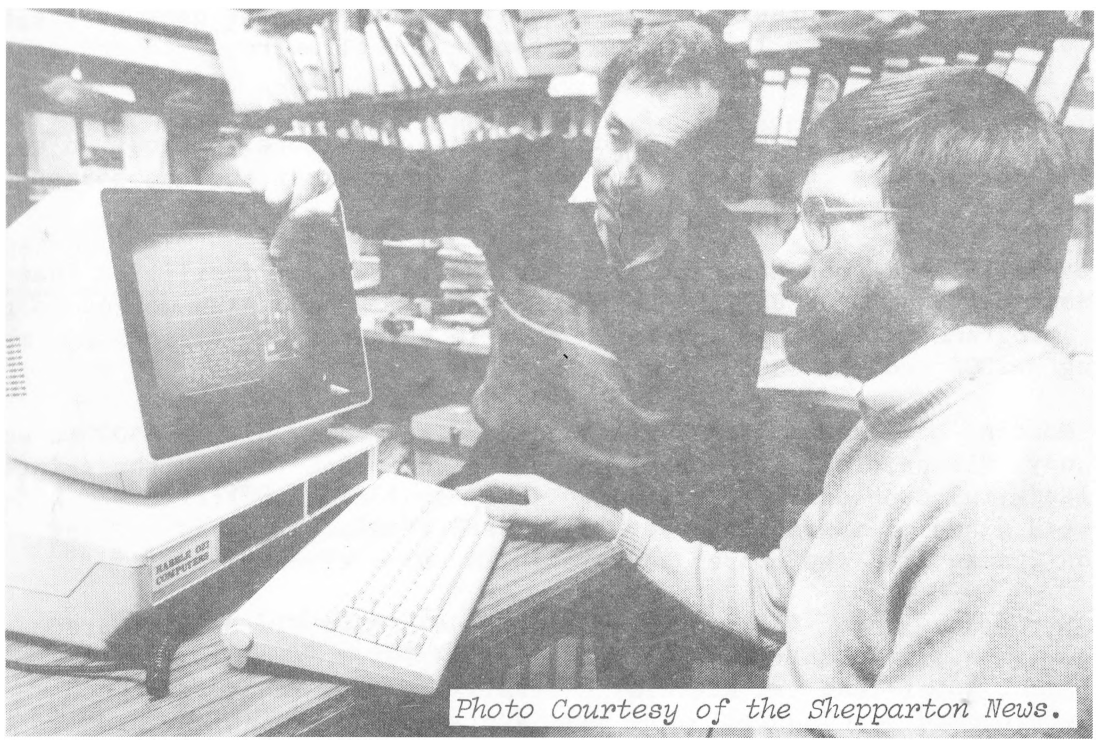

RABBLE 65 designers, Bill Chilcott and Ray Gardiner.

Ray has just returned from the U.S.A. where he showed the RABBLE 65 at the TECHEX 84 Trade Fair. See page 3.

The next meeting will be at 2pm on Sunday 27th May at the Essendon Primary School which is on the corner of Raleigh and Nicholson Streets, Essendon. The school will be open at 1pm.

The closing date for articles for the next newsletter is 8th June.

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QUEENSLAND KAOS MEETING

by Ed Richardson

Attendance: 15 members, 3 guests. Computers: 2 BBC, 4 OSI.
Brendon Vowles had phoned to say that he had a prior committment to give a talk on T.A.B. to the CP/M User Group. As the new Compsoft CP/M board offers OSI owners a chance at the huge CP/M library of software, a good relationship with other CP/M users would seem an excellent idea.

Robin Wells was the first to arrive with his new BBC/B. To enable his two ex OSI MPI drives to work with the new machine, he had first to remove the data separators.

John Froggatt has added an 80 track drive to his BBC since the last meeting. However he continues to work on his already much modified C1P. He expressed the view that there is so little that needs to be done to the BBC that the only real way to learn about hardware and firmware is to update the C1P to make it do what he wants.

Alan Calvert hopes to add an 8" drive to his C4/Rabble combination soon. Since the last meeting he has added an Eprom programmer and the socket was neatly mounted to the far right of the keyboard.

Bernie Wills had no new hardware, but showed us some facilities that he has provided by modifying various Eproms recently. He and Alan worked to get the Eprom programmer working, and Ian Mackenzie needed a new Basic 3 now that he was using HexDOS and not OS65D.

Tony Morton had asked for some assistance to modify his WP-6502 to work with a Tandy V11 printer. The problem was the auto line-feed on the printer. This resulted in double line spacing. I had figured out a little M/C add-on which worked fine on my cassette version. Unfortunately, loaded on Tony's C1 MF, I couldn't even find the proper location! To be continued.....

Mike Stoopman, from the service department of The Electronic Warehouse, dropped in with a friend to view the proceedings. T.E.W. are now selling BBC's at prices much lower than the official Australian agent, and have a good range of other microcomputers as well. He also explained the technique used in the BBC to allow for a lot more ROM than the 64K which could be addressed.

Much discussion was held regarding the future of OSI, Apple and the other obsolute machines. Ian Mackenzie expressed the view that OSI's and Microbees would be quite satisfactory in the school enviroment for at least five to six years. Tom Yapp thought that there was still nothing to match the OSI for value in the amateur radio field. Robin and John, hunched over their 747 flight simulator controls as they neared touchdown, seemed oblivious to all else. Seconds later came the crashes. If nothing else, the sound is spectacular on the BBC.

Nev Villiers expressed dismay that he seemed to be the only member in Queensland with 8" disks (C8 DF). He would be pleased to correspond with owners of similar machines anywhere in Australia.
Nev Villiers,

The meeting closed at 5.30 pm. Next meeting June 17th. I will not be able to provide video monitors at future meetings.

RABBLE 65 WINS U.S. AWARD

RABBLE OZI COMPUTERS were awarded one of the techexcellence awards at TECHEX84 held during April in Orlando, Florida.

The significant features of the RABBLE 65 which attracted attention were the single board construction, extensive I/O facilities provided on board coupled with the fast, high capacity disk drives and the provision of four high speed I/O channels.

Some 4000 products competed for the seven awards at TECHEX 84, the world's largest trade fair for new technology available for license and technology transfer.

The RABBLE OZI COMPUTER's stand was sponsored by the Australian Department of Trade, and represented by Ray Gardiner.

As a result of the fair the RABBLE 65 may be licensed for manufacture in several overseas countries, with the main prospects being CANADA, U.K. and GERMANY. Talks are still proceeding on a joint development venture with companies in the U.S. and U.K.

PIA PRINTER PORT

by Leo Jankowski

In Vol 4/5 some members of KAOS-WA expressed an interest in implementing a parallel printer port. Maybe what follows is irrelevent to their needs but it does offer a solution for converted SII/C1P's.

Most of the information for this appeared in Vol 3/4 and 3/9. The program below can be squeezed into the top of BEXEC* OS65D 3.2 or 3 (change the line numbers to suit). The base address of the PIA is assumed to be $C004, as on the Tasker I/O board (see Vol 2/5 page 3 for DD line mod.), but a PIA at any address could be used.

PIA output to printer input, is implemented as follows:
1) connect pins 2 to 9 on the PIA (port A) to pins 2 to 9 on a 36 way centronics printer plug (if it fits your printer!).
2) pins 10 & 11 of the PIA (port B) go to pins 1 & 11 of the printer plug.
3) for the printer plug, pins 19 to 27 & 30 go to earth. Pin 14 to earth will force an extra line feed (un-necessary with the MX-80).
It's that simple!

```
10 FOR X=9375 TO 9390 :READ A :POKE X,A :NEXT :P=49156
20 POKE P+1,0 :POKE P,0 :POKE P+3,0 :POKE P+2,0
30 POKE P,255 :POKE P+1,4 :POKE P+2,1 :POKE P+3,4 :POKE P+2,1
40 DATA 141,4,192,206,6,192,238,6,192,173,6,192,41,2,208,249
```

Omit line 20 if you have a hardware reset to the PIA. The final POKE in line 30 sends the strobe line high (as for MX-80).

Superboard

May, 1984.

Newsletter of the Ohio Superboard User Group, 146 York Street, Nundah, 4012.

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1984 OSUG PROGRAMMING COMPETITION RESULTS

The programming competition for 1984 has been run and won. The first five placegetters in the 24 x 24 section of the competition were all very close, with only a few points separating the second, third and fourth places.

Winner: BASIC EXTRAS by Bernie Wills.
Second: GUNFIGHT AT OK AIRFIELD by Craig Dillon.
Third : VAMPIRE TREASURE by Sean Davidson.
Fourth: MAZE OF THE MUTANT CARD SYMBOLS by Gerard Campbell.

In the 32 x 64 section, there were only two prizes offered, as the number of entries was only five. (Twelve entries in the 24 x 24 section.)

Winner: EXECUTION by Derryl Cocks.
Second: VAMPIRE TREASURE by Sean Davidson.

Winners received $25, Seconds $10, Third $6, and Fourth $4.

* BASIC EXTRAS is a utility, giving screen fill, printat, user, plot, and block fill functions.
* GUNFIGHT AT OK AIRFIELD is a two player arcade game with a very original concept. Each player controls an aircraft, and the aim is to take off, avoiding a mountain, and destroy your opponent's aircraft and cities. To fit all this on a 24 x 24 screen was an impressive feat.
* VAMPIRE TREASURE is an adventure. Even though clues were given, the treasure proved very elusive. A very well thought out game which was entered in both sections of the competition, and won a prize in each.
* MAZE OF THE MUTANT CARD SYMBOLS is a very fast arcade game in the Pacman mould. There were a couple of features built into it to increase the risks and hence the enjoyment. Great graphics.
* EXECUTION is a hangman style game with a difference. It was entered in both sections of the competition and only narrowly missed fourth place in the 24 x 24. Execution was by firing squad. The graphics were very well done.

Other entries (not in finishing order) were: Co-ordinate Geometry Lesson, Scramble, Maths Astronaut, Muncher, Country Driver, M/C to Basic Data Strings, Meteorites, Hangman, and City Bomber.

Copies of the full competition tape are available to library members at the usual postage costs.

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ANSWERS TO WORD CAGE PUZZLE

QUIZ : WURZBURG , JERUSALEM, ISRAEL
MYSTERY WORD : INTROSPECTION

- -

NEXT MONTH

NOS Basicode:- Specifications and protocol. Some more software. Another review.

— SUPERBOARD —

SOFTWARE REVIEW - *Starfighter*

I quote from the Aardvark Catalog. "*This real-time space war game is one of our best. You will pilot a cruiser on a mission where you will face up to ten alien vessels. You will be armed with a variety of weapons with realistic characteristics. Starfighter features a full visual display of the alien vessels and working instrumentation. Your speed, range, weapons status and damage status are displayed continuously. It also has ten levels of difficulty built in*". It sounds good, doesn't it, but Starfighter would have to be one of the most boring arcade games that I have ever played.

The only worse one I can think of was OSI's "BOMBER", It is dreadful!

The game is slow, monotonous, and requires no skill at all to play. Both you and the kids would be hopelessly bored after the first game. I suppose that no program is without some merit, and there may be something of interest or to learn from the programming, but I suggest you look elsewhere. STARFIGHTER was never one of Aardvarks best! The words above are a classic example of the misleading information that can be given out by the program author. Having spent your money on the software on the basis of a good review, just try to get it back from the software seller!

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THE OSI PROBLEM SOLVER - *Simultaneous Equations.*

> At a market, a vendor was selling three kinds of fruit. The first customer bought three oranges, two bananas, and one apple for 23¢. Another man paid 36¢ for two oranges, seven bananas, and two apples. The next sale was four oranges, one banana, and four apples for 46¢. If you wanted to buy two apples, what would be the cost?

Though my schooltime memories are dimming, I can still recall having to solve simultaneous equations. The puzzle above can be best solved with these techniques.

The subroutine presented here will solve such equations in any number of unknowns. The time taken to solve them is approximately proportional to the cube of the number of equations, however even equations in ten unknowns take only a few seconds! Small rounding errors may occur in the answers due to limitations in the accuracy of the OSI Basic. Negative numbers are OK.

```
100 IF N=1 THEN S(1)=V(1)/A(1,1):RETURN
110 FOR W=1 TO N-1:R=ABS(A(W,W)):F=W:FOR H=W TO N
120 IF ABS(A(H,W))>R THEN R=ABS(A(H,W)):F=H
130 NEXT:IF F=W GOTO 160
140 FOR H=W TO N:R=A(W,H):A(W,H)=A(F,H):A(F,H)=R:NEXT
150 R=V(W):V(W)=V(F):V(F)=R
160 FOR H=W+1 TO N:R=A(H,W)/A(W,W):FOR F=W TO N
170 A(H,F)=A(H,F)-R*A(W,F):NEXT:V(H)=V(H)-R*V(W):NEXT:NEXT
180 FOR W=N TO 1 STEP-1:R=V(W):IF W=N GOTO 200
190 FOR H=W+1 TO N:R=R-S(H)*A(W,H):NEXT
200 S(W)=R/A(W,W):NEXT:RETURN
```

Variables: A(N,N) Two dimensional array holding matrix of coefficients.
V(N) The right hand side of the equation.
S(N) The solutions
W,R,F,H are all general purpose variables.

Looking at the above subroutine, I must admit that it is squashed up into an awful mess, and it is extremely difficult to see how it all works. I will try in future programs to spread them out. In the meantime it might be an interesting exercise to try to figure it out for yourselves.

— SUPERBOARD —

Here is a program to solve the puzzle about the fruit, and exercise the simultaneous equation solving routine for a full half-second!

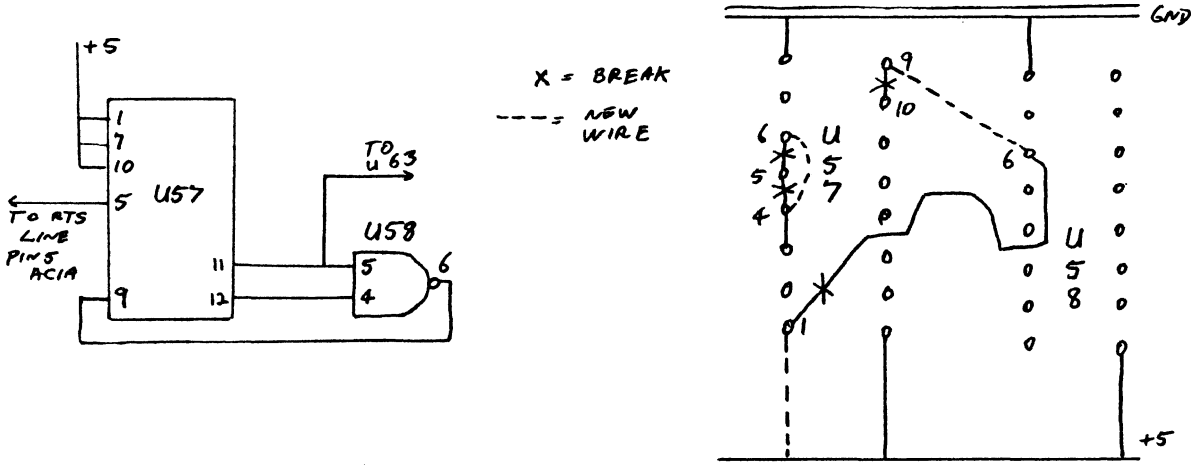
```
10 DATA 3,2,1,23
20 DATA 2,7,2,36
30 DATA 4,1,4,46
40 DIM A(3,3),V(3),S(3):REM Only needed if more than ten unknowns.
50 N=3 :REM Number of unknowns.
60 FOR W=1 TO N:FOR H=1 TO N:READ A(W,H):NEXT H
70 READ V(W):NEXT W: GOSUB 100: PRINT S(3)*2:END
```

- -

NEAT HARDWARE MOD FOR 110 BAUD TELETYPES

Way back in one of the early OSUG newsletters, I published a circuit of a 110 Baud mod for Teletypes of the ASR 33 type, using a 555 timer. The main disadvantage of such a circuit is the difficulty of setting it onto the correct frequency, and the tendency for the frequency to drift depending on the prevailing temperatures.

This method gives a stable output, and is neater to do than the proto area circuit. In addition, the series 2 superboard does not have a proto area.



Under the board: Below U 57 : Break tracks from pins 9 to 10, 4 to 5 and 5 to 6. Join pins 4 to 6.
Break track from pin 1 as shown, and join pin 1 to the +5 rail. Join pin 5 to pin 5 of the ACIA (6850), the RTS line.
Below U 58 : Join pin 6 to pin 9 of U 57.

To use the 110 baud, it is necessary to poke to the ACIA. This can be done in a program, and also, of course, the save flag must be set.

POKE 61440,3: POKE 61440,82 for 110 Baud.

The easiest way to reset before saving to cassette, is to reset with BREAK.

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COMING

Lo and behold, an IBM clone from Taiwan is born! I'll be looking at what IBM or its copies offers to the OSI (or ex OSI) owner in a similar way to the Apple article last month. While I'm at it, I'll try to extract an article on the advantages of the BBC from a new owner. Articles are getting hard to come by and I could do with some help.

H E L P

Ed Richardson.

RUNNING CP/M ON A C1P-MF

by Tony Brown

Why spend a fortune buying a Z80 card? My system is a C1P-MF with a MPI-B52 disk drive, 51K RAM, modified video 64x32 display, C1P keyboard.

I was getting fed up with the primitive way the files are organised under OS65D3.3, so I thought about the possibility of modifying my system to run CP/M, by installing a Z80 instead of the 6502.

When I first thought of the idea I had to decide whether to replace the 6502 completely, or make the two interchangeable. I decided on the latter, just in case the modifications didn't work. This meant that the new Z80 had to run with the existing boards and MEMORY MAP. This was by far the simplest solution and the cheapest. The complete modification can be done for less than !!!! $20 !!!! excluding the cost of the monitor ROM, CP/M etc.

The first step was to have a look at the data books of the two micros. There appeared to be many similarities between the name of the signals and what they did. Also some of the complex signals used in the 6502 were not actually connected (interrupt signals etc.).

Another problem was the generation of the clock2 signal, which is used all over the place on the 600 and 610 boards.

The main problem was how to physically install the new Z80 inside the old machine. I eventually decided to build the new circuitry on a piece of veroboard, and mount a 40 pin header underneath the veroboard, which would plug directly into into the existing 6502 socket on the 600 board.

The next thing to do was to decide what software to run on powering the machine up. With the help of a friend we decided on a modified SORCERER Monitor, which would fit into 2K and still leave room for the Bootstrap.

The monitor ROM still resides at F800H, so a POWER ON JUMP had to be built to get the monitor to start executing, as the reset on a Z80 starts at address 0000H.

The method of running the Z80, is to remove the old ROM at F800H and replace it with the new ROM, remove the 6502 and replace it with the veroboard and header containing the Z80 and associated circuitry (about 6 chips).

As far as running CP/M, the DISK FORMAT had to be looked at, and the simplest way was to use something similar to the original layout. ONE SECTOR per track 2K in length, with a track header followed by 2K bytes of data followed by a block check byte.

My particular system uses a MPI-B52 doubled sided drive so the BIOS I wrote uses the full 80 tracks, but with a small change can be modified to use a MPI-B51 single sided drive. Also as I only have one drive, built into my BIOS is a single program to prompt the user to change disks when using drive A or drive B.

My system now has CP/M running at A400H with the BIOS at BA00H and data buffers at C800H. The first 4 tracks on each disk is the system program and the 5th track is the directory, leaving me 75 tracks for programs (150K bytes). My Z80 runs at 2MHz.

Some later modifications I carried out on my machine were:-

1. Replace the old ROM BASIC with 6116 RAM chips to increase memory from 40K to 48K.
2. Replace the Character generator chip with a 2716 ROM with the top 128 characters the inverse of the bottom 128 characters (to enhance programs such as Wordstar and DBase II).
3. Add another 3K of memory at C800H to use as data buffers for the BIOS, to be able to run large CP/M programs, such as DBase II.

I can be contacted at

AMATEUR RADIO PROGRAMS

by Clive Harman (VK3BUS)

The following programs which have been collected from various sources, are available from KAOS for Superboards. It would take too long to give credits here but quite a few have come from the OSUG group, contributed by Bob Trockford, Paul Roehrs etc., others are from KAOS members and include programs from Col Haustofer, Rob Bretterecker, Rod Drysdale, Erik Sundstrup etc.

Programs can be obtained by sending a stamped addressed package with a replacement blank cassette/disk to Clive Harman, P.O. Box 41, Macedon 3440. As many of the programs are very short on documentation and may require small interfaces to your machine and program variations for screen/machine/monitor formats, it would be in your interest to contact me on 054 261233 to discuss the matter or to arrange a sked to fully discuss the program before you send for it.

PROGRAM	REMARKS
Rtty - M/c	Program has keyboard buffer etc. no split screen.
Rtty - BASIC	OK for Rx purposes, limited use on Tx.
Rtty/Cw Rx only	Basic Rx only program, good for Shortwave listeners.
Morse Tutor	Good program, BASIC.
Antenna Beam Heading	Disk BASIC program, seems quite accurate enough.
Contest Check Log	Very simple BASIC program, limited use.
Antenna Dimensions	Programs for Log Periodic, Quad, Yagi, Helical.
Log Book Programs	Various programs, long, short, Disk/ROM BASIC.
Resistor Parascan	Selects standard values to give non standard requirement.
Oscar 9/10 Tracking	BASIC ROM program, OK for disk.
RTTY BASIC	Gives split screen ops and many extras, requires extensive hardware mods using external 6551 Uart on Rabble Expansion Board, still being developed.

All the above programs will run on C1, they may need slight modification for C4 look-alike. They use ROM BASIC unless otherwise noted and can be supplied on cassette or disk (PICO/HexDOS) in some cases. The machine code Rtty is available in 24/48/64 screen format, slight conversions would be needed for C4 or Cegmon. We hope to soon have a Contest program that will keep logs and give a print-out for scoring purposes.

If any Amateurs or others have programs that they think would be of interest or have a need for a specific program, would they please contact me.

TASKER BUS CMOS CLOCK CARD

by Leo Jankowski

The program listing below will set the clock up correctly, as a 24 hour clock. If the day if required, read the days of the week into an array and match to the value in P(6). The parts listing given in David Tasker's article in KAOS vol. 4/5 is incorrect. R2 should be 10 000 ohms.

```
5 PRINT!(28) :REM CLS OS65D3.3
10 PRINT TAB(8)"-------  KLOK2 MSM5832 by LZ JANKOWSKI  -------"
20 PRINT :PRINT TAB(12)"THIS PROG SETS THE TIME FOR 24 HR KLOK."
30 PRINT :PRINT :INPUT "Do you wish to READ the time ";Q$
35 IF Q$="Y" OR Q$="y" THEN 290
40 PRINT!(28) :DIM P(20) :PIA = 50436 : REM $C504
50 GOSUB 500 :PRINT"On clock card - close SW1 only." :PRINT
60 PRINT "Use numbers to answer the following questions." :PRINT
70 INPUT"Year      ";P(15)
80 INPUT"Month     ";P(16)
90 INPUT"Day       ";P(17) :P(18)=24
100 INPUT"Hour      ";P(19)
110 INPUT"Minute    ";P(20)
120 PRINT :INPUT"Day of week (Sunday=0) ";P(6)
125 PRINT :INPUT"Leap Year (Y/N) ";LY$
130 P(0)=0 :P(1)=0 :C=20
140 FOR X=2 TO 12 STEP 2 :IF X=6 THEN X=7
150 :   P(X)=P(C)-10*INT(P(C)/10) :P(X+1)=INT(P(C)/10)
160 :   C=C-1 :IF C=18 THEN C=17
170 NEXT
180 P(5)=P(5)+8 :IF LY$="Y" THEN P(8)=P(8)+4
190 :
195 REM WRITE the time.
200 POKE PIA,15 :POKE PIA+1,4 :POKE PIA+2,95 :POKE PIA+3,4
210 POKE PIA+2,16 : REM HOLD
220 FOR X=0 TO 12
230 :   POKE PIA,X :POKE PIA+2,P(X)+80
240 :   POKE PIA+2,P(X)+16
250 NEXT
260 PRINT :PRINT :INPUT"Ready for GO! ";Q$
270 POKE PIA,0 :POKE PIA+2,0
280 :
285 REM READ the time.
290 PRINT!(28) :PRINT"READ THE MSM 5832 KLOK" :PRINT :PRINT
295 CLEAR :DIM P(15) :PIA=50436 :RH=48 :I=12 :F=15 :T=2 :Z=0
300 GOSUB 500
310 POKE PIA,255 :POKE PIA+1,4 :POKE PIA+2,240 :POKE PIA+3,4
320 POKEPI+T,RH :FORX=ZTOI:POKEPI,X:P(X)=PEEK(PI+T)ANDF:NEXT
330 POKE PI+2,0 :POKE PI,0
340 H=10*(P(5) AND 3)+P(4) :M=10*P(3)+P(2) :S=10*P(1)+P(0)
350 MO=10*P(10)+P(9) :DM=10*(P(8) AND 3) +P(7) :Y=10*P(12)+P(11)
370 :
375 REM Write time & date to screen.
390 PRINT :PRINT :PRINT " HR : MI : SS" TAB(21) "DM / MO / YR"
400 PRINT :PRINT H ":" M ":" S TAB(20) DM "/" MO "/" Y :PRINT
410 PRINT:INPUT"Again ";Q$ :IF Q$="Y" THEN PRINT!(28) :GOTO 320
420 END
500 POKE PIA+1,0 :POKEPIA,0 :POKEPIA+3,0 :POKEPIA+2,0 :RETURN
```

THE APPLE

by David Anear

This is the second in a number of articles briefly describing the Apple computer.

Interfacing to the Apple is not as easy as the OHIO as the memory map is full on a 48K machine so there appears, at first, to be no memory for special drivers etc. There are 8 slots in the back of the machine for expansion and I'll try to explain their unusual operation. Like the OHIO the I/O (slots) are in the $C000-C7FF area of memory. Each slot has a number of unique addresses assigned to it:-

(1) Device select - 16 addresses are set aside for each slot which are like the 16 pin I/O in operation and re used to control any hardware on the card.

(2) I/O select - Each card has a 256 byte ROM area assigned to it which holds the software to drive the card.

(3) I/O strobe - Each card has a common line which goes low when the $C800-CFFF area of RAM is addressed.

(4) A0-A15, D0-D7, R/W, Clocks, Interrupts, DMA, and Reset are also available as well as +5V, +12V, -5V and -12V.

Having built your interface ie:- A PIA driving a blow up model of Jeff Rae, (every home should have one!) and placing all the hardware in the 16 address area serviced by Device Select; you come to write the software and find you need more than the 256 bytes allowed by I/O select. What to do!! Pinch the $C800-CFFF ROM area , I hear you cry! But if we do this any other card which also needs the area will get your software. HEREIN LIES THE TRICK!! Every card has a decoder on it set up for $CFFF so that when you address this location, all cards will lock out their $C800-$CFFF ROM leaving the $C800 area free. The first card to call its 256 bytes area after this will automatically switch in it's $C800 ROM into the $C800 area.

It sounds complicated but is surprisingly easy and can be done with a latch and a few gates. From this you can see that every card can hold a special driver ROM for its exclusive use. This is how the Apple can have so many devices on tap at any time.

It becomes very easy to fill up these slots, as my own machine carries a printer card, voice synth. card, RGB and 80 Col. video card, Z80 (ugh!) card, Serial card, Floppy disk controller and an Ohio type 16 pin I/O board.

The only other I/O besides the cassette port is the paddle/games port. This is a 16 pin socket on the mother board into which you can plug 4 hand controls, or two joysticks, and three switches. The port also has four annunciators (a fancy name for an output line) which can drive a 74LS TTL load, a strobe line, and +5 volts at 100 ma.

The paddles and joysticks use linear pots, unlike the switch types used on the Ohio, Atari and Commodore computers. The basic mechanism for making your own joysticks can be obtained from a Dick Smith or Tandy store, with the total cost of making a joystick between $10 and $15.

There are some very elaborate joysticks available for the Apple with the top of the line unit probably being the BIT STIK, a precision joystick for Hi-Res drafting which costs $750+ inc. software.

That's all for this month, I'll talk about the funny (strange) disk drives next month.

MORE ON FORTH
by King Corky

Here are a couple of Forth Screens to enable you to turn on your printer and re-configure the printer character size and line pitch. These WORDS were written for the Microline 82A, but they should be easily adapted to other printers.

```
PRLIST.....will list screens n1 to n2 to the printer.
PRMODE.....is the WORD used to send the commands to the printer.
PRSMALL....gives small print, ie. 16.5 char/inch at 8 lines/inch.
PRBOLD.....gives the enhanced or wide characters.
PRNORM.....sets back to normal character size.
PR6 & PR8...alter the lines/inch, (6 or 8), without altering
             the character size.
PRLONG.....is the normal number of characters per line,
           from column 1 to column 80.
PRSHORT....is the short line mode which prints from column 9 thru to
           column 72.  This is similar to adjusting
           the left and right margins.
PRFF.......causes the printer to form feed.
PRCLR......clears the printer buffer, lets you start with a clean sheet
           with nothing left hanging over from the
           previous print run.
```

```
SCR # 1
0  ( Printer Reconfigure Words                          )
1
2  DECIMAL FORTH DEFINITIONS
3  : PRLIST   ( print screens on printer..n1 n2 PRLIST )
4        PR 1 + SWAP DO I LIST LOOP CR CR CR PR ;
5  : PRMODE    ( printer reconfigure )
6        PR EMIT EMIT EMIT PR ;
7  : PRSMALL   ( 16.5 characters/inch & 8 lines/inch )
8        13 13 29 PRMODE 13 56 27 PRMODE ;
9  : PRBOLD  ( print bold characters )
10       13 31 29 PRMODE ;
11 : PRNORM  ( print normal size characters )
12       13 13 30 PRMODE ;
13
14 -->
15
```

```
SCR # 2
0  ( More printer reconfigure words                   )
1  DECIMAL
2  : PR6     ( 6 lines/inch )
3     13 54 27 PRMODE ;
4  : PR8     ( 8 lines/inch )
5     13 56 27 PRMODE ;
6  : PRLONG  ( sets printer to long line )
7     13 65 27 PRMODE ;
8  : PRSHORT ( sets printer to short line )
9     13 66 27 PRMODE ;
10 : PRFF    ( printer form feed )
11    13 12 PRMODE ;
12 : PRCLR ( clears printer buffer )
13    13 24 PRMODE ;
14
15 ;S
```

A MESSAGE FROM THE B.B.C.

There has been some interest shown in forming a sub group for the B.B.C. Micro. If you own a B.B.C. or intend to purchase one contact KAOS. If there is enough interest we will get a group started.

Computer Dynasty of 15 Florence St, Hornsby, 2077, ph.02 4776886 offer the Amust 816 briefcase computer at $2995 plus $545 tax. Running a Z80 under CP/M2.2, this offers a full range of business type software included in the price. It sports 2x800K disk drives and 64K RAM, a centronics and serial port, connection for 2 external 8" drives and also a hard disk. There is an internal 5" monitor with a connection for an external monitor also. Finally, it can read and write other systems disks, including Osborne, Kaypro, Dec Rainbow, Morrow, IBM under CP/M, an HP125. A pirates delight!

THE 6502 STRIKES BACK (and wins)

by Ray Gardiner

Many microprocessors have been produced since the 6502 first appeared in 1975, but few have been able to match the speed of the pipelined architecture and page zero addressing modes. Even today the humble 6502 still can outrun the much younger 8088 used in the IBM PC. However there are newer and more powerful processors such as the 68000 and 16032 currently available which utilize 32 bit internal registers and 16 bit external data bus coupled with high clock rates and very powerful instruction sets.
This you might be excused for thinking is the ultimate demise of the 6502 family (R.I.P.)??

Western Design Centre in Phoenix have announced preliminary details of their new W65SC816, 6502 compatable micro which will be available later this year in versions up to 10MHz !!!. Now as you all know, the 6502 completes one memory cycle per clock cycle, consequently the bus-bandwidth of the '816 is 10 Megabytes per second, since the op-codes are 8 bits that means 10 million op-codes per second, (now we need some fast memory!!!). In comparison the 68000 requires 4 clock cycles to fetch 16 bits of data, so a 12MHz 68000 system with no wait states will have a bus-bandwidth of 6 Meager bytes per second. And that ain't all, the 68000 op-codes are all 16 bits wide so the rate at which the 68000 can fetch op-codes is 3 million op-codes per second.

If you read the foregoing and came to the conclusion that the '816 is going to be three times faster than the 68000 then you are totally wrong, it definately will not be that much faster, this is wholly due to the superior instruction set of the 68000 in that a particular 68000 instruction may require many '816 instructions to perform the same function. Also the greater internal resources of the 68000 (16 32 bit internal registers) will mean generally less need to fetch data from external memory.

In conclusion it is impossible to say how the '816 will compare with the 68000 benchmarks. What we can say is that it will be up to 10 times faster than existing 6502 systems and that, dear friends, will take a great deal of catching!!!

W65SC816

OXI-CMOS W65SC8XX and W65SC9XX 16-Bit Microprocessor Family

Features

- Advanced CMOS design for low power consumption and increased noise immunity
- Single +5V power supply
- Emulation mode allows complete hardware and software compatibility with NMOS 6502 code
- 24-bit address bus allows access to 16 MBytes of memory space
- Full 16-bit ALU, Accumulator, Stack Pointer, and Index Registers
- Valid Data Address (VDA) and Valid Program Address (VPA) output allows dual cache and cycle steal DMA implementation
- Vector Pull ($\overline{VP}$) output indicates when interrupt vectors are being addressed. May be used to implement vectored interrupt design
- Abort ($\overline{ABORT}$) input and associated vector supports interrupting any instruction without modifying memory or registers
- Separate program and data bank registers allow program segmentation
- New Direct Register allows "zero page" addressing anywhere in first 64K bytes
- 24 addressing modes—13 original 6502 modes, plus 11 new addressing modes
- New Wait for Interrupt (WAI) and Stop the Clock (STP) instructions further reduce power consumption, decrease interrupt latency and allows synchronization with external events
- New Co-Processor instruction (COP) with associated vector supports co-processor configurations, i.e., floating point processors
- New block move ability

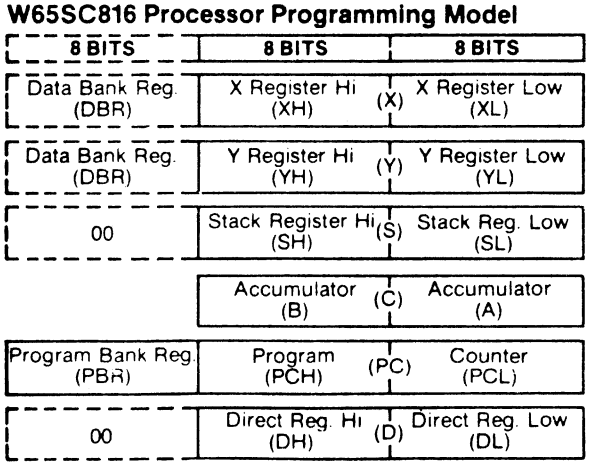
General Description

WDC's W65SC802 and W65SC816 are OXI-CMOS 16-bit microprocessors featuring total software compatibility with their 8-bit NMOS and CMOS 6500-series predecessors. The W65SC802 is pin-to-pin compatible with 8-bit devices currently available, while the W65SC816 extends addressing to a full 16 megabytes. These devices offer the many advantages of WDC's OXI-CMOS technology, including increased noise immunity, higher reliability, and greatly reduced power requirements. A software switch determines whether the processor is in the 8-bit "emulation" mode, or in the full 16-bit mode, thus allowing existing systems to use the expanded features.

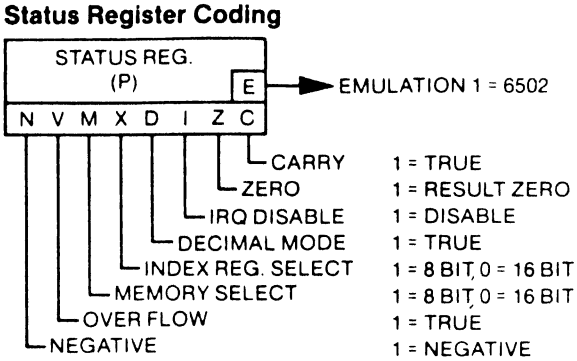
As shown in the processor programming model, the Accumulator, ALU, X and Y Index registers, and Stack Pointer register have all been extended to 16 bits. A new 16-bit Direct Page register augments the Direct Page addressing mode (formerly Zero Page addressing). Separate Program Bank and Data Bank registers allow 24-bit memory addressing.

Four new signals provide the system designer with many options. The $\overline{ABORT}$ input can interrupt the currently executing instruction without modifying internal registers. Valid Data Address (VDA) and Valid Program Address (VPA) outputs facilitate dual cache memory by indicating whether a data segment or program segment is accessed. Modifying a vector is made easy by monitoring the Vector Pull ($\overline{VP}$) output.

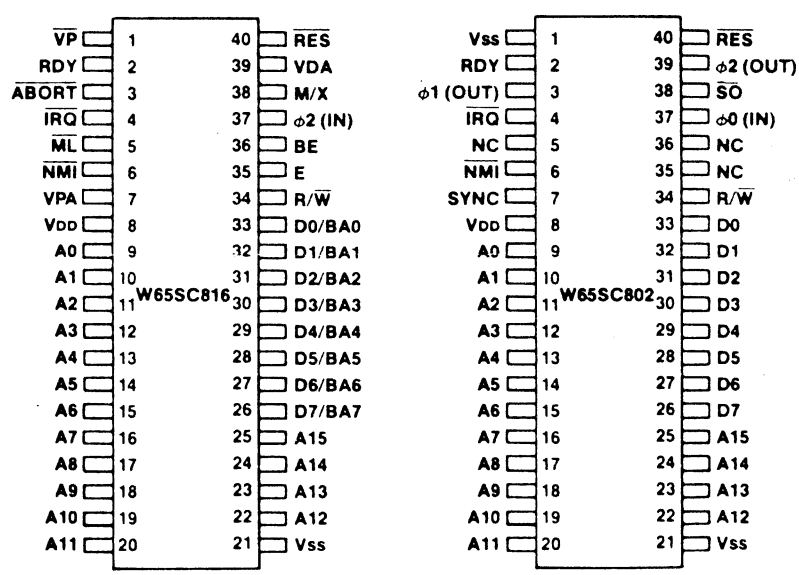
W65SC816 Processor Programming Model



Status Register Coding



Pin Configuration



Design Engineer William D Mensch Jr

THE WESTERN DESIGN CENTER, INC.
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Advance Information Data Sheet: This is advanced information and specifications are subject to change without notice.

Table 2. Instruction Set

W65SC816 Instructions (256 OP Codes)

A. The Original 6502 Instruction Set (151 Op Codes)

1.	ADC	Add Memory to Accumulator with Carry
2.	AND	"AND" Memory with Accumulator
3.	ASL	Shift Left One Bit (Memory or Accumulator)
4.	BCC	Branch on Carry Clear
5.	BCS	Branch on Carry Set
6.	BEQ	Branch on Result Zero
7.	BIT	Test Bits in Memory with Accumulator
8.	BMI	Branch on Result Minus
9.	BNE	Branch on Result Not Zero
10.	BPL	Branch on Result Plus
11.	BRK	Force Break
12.	BVC	Branch on Overflow Clear
13.	BVS	Branch on Overflow Set
14.	CLC	Clear Carry Flag
15.	CLD	Clear Decimal Mode
16.	CLI	Clear Interrupt Disable Bit
17.	CLV	Clear Overflow Flag
18.	CMP	Compare Memory and Accumulator
19.	CPX	Compare Memory and Index X
20.	CPY	Compare Memory and Index Y
21.	DEC	Decrement Memory by One
22.	DEX	Decrement Index X by One
23.	DEY	Decrement Index Y by One
24.	EOR	"Exclusive-or" Memory with Accumulator
25.	INC	Increment Memory by One
26.	INX	Increment Index X by One
27.	INY	Increment Index Y by One
28.	JMP	Jump to New Location
29.	JSR	Jump to New Location Saving Return Address
30.	LDA	Load Accumulator with Memory
31.	LDX	Load Index X with Memory
32.	LDY	Load Index Y with Memory
33.	LSR	Shift One Bit Right (Memory or Accumulator)
34.	NOP	No Operation
35.	ORA	"OR" Memory with Accumulator
36.	PHA	Push Accumulator on Stack
37.	PHP	Push Processor Status on Stack
38.	PLA	Pull Accumulator from Stack
39.	PLP	Pull Processor Status from Stack
40.	ROL	Rotate One Bit Left (Memory or Accumulator)
41.	ROR	Rotate One Bit Right (Memory of Accumulator)
42.	RTI	Return from Interrupt
43.	RTS	Return from Subroutine
44.	SBC	Subtract Memory from Accumulator with Borrow
45.	SEC	Set Carry Flag
46.	SED	Set Decimal Mode
47.	SEI	Set Interrupt Disable Status
48.	STA	Store Accumulator in Memory
49.	STX	Store Index X in Memory
50.	STY	Store Index Y in Memory
51.	TAX	Transfer Accumulator to Index X
52.	TAY	Transfer Accumulator to Index Y
53.	TSX	Transfer Stack Pointer to Index X
54.	TXA	Transfer Index X to Accumulator
55.	TXS	Transfer Index X to Stack Register
56.	TYA	Transfer Index Y to Accumulator

B. New W65SCXXX Instructions (13 Op Codes)

1.	BRA	Branch Relative always
2.	PLX	Pull X from Stack
3.	PLY	Pull Y from Stack
4.	PHX	Push X on Stack
5.	PHY	Push Y on Stack
6.	STZ	Store Zero in Memory (Direct; Direct, X; Abs; Abs, X)
7.	TRB	Test and Reset Memory Bits Determined by Accumulator A (Direct and Absolute).
8.	TSB	Test and Set Memory Bits Determined by Accumulator A (Direct and Absolute).

C. New W65SCXXX Addressing Modes (14 Op Codes)

2.	BIT	Test Bits in Memory with Accumulator (Direct, X; Absolute, X; Immediate).
2.	DEC	Decrement (Accumulator)
3.	Group I	Instructions (Direct Indirect (8 Op Codes))
4.	INC	Increment (Accumulator)
5.	JMP	Jump to New Location (Absolute Indexed Indirect)

D. Group I Instructions with New Addressing Modes (48 Op Codes)

- Direct Indirect Long Indexed with Y (8 Op Codes)
- Direct Indirect Long (8 Op Codes)
- Absolute Long and Absolute Long Indexed with X (16 Op Codes)
- Stack Relative (8 Op Codes)
- Stack Relative Indirect Indexed Y. (8 Op Codes)

1.	ADC	Add Memory to Accumulator with Carry
2.	AND	"AND" Memory with Accumulator
3.	CMP	Compare Memory and Accumulator
4.	EOR	"Exclusive-or" Memory with Accumulator
5.	LDA	Load Accumulator with Memory
6.	ORA	"Or" Memory with Accumulator
7.	SBC	Subtract Memory from Accumulator with Borrow
8.	STA	Store Accumulator in Memory

E. New Push and Pull Instructions (7 Op Codes)

1.	PEA	Push Effective Absolute Address or Immediate Data Word on Stack
2.	PEI	Push Effective Indirect Address or Direct Data Word on Stack
3.	PER	Push Effective Program Counter Relative Indirect Address or Program Counter Relative Data Word on Stack
4.	PLB	Pull Data Bank Register from Stack
5.	PLD	Pull Direct Register from Stack
6.	PHB	Push Data Bank Register on Stack
7.	PHD	Push Direct Register on Stack
8.	PHK	Push Program Bank Register on stack

F. Status Register Instructions (2 Op Codes)

1.	REP	Reset Status Bits Defined by Immediate Byte 1 = Reset 0 = Do not change
2.	SEP	Set Status Bits Defined by Immediate Byte 1 = Set 0 = Do not change

THE MEETING WAS KAOS

by King Corky

The big news this month is that the Rabble boys are back after a most successful showing in Florida. Apparently the yanks weren't over impressed but the Canadians were very much so, as were some countries in Europe. I think the trouble with our American friends is that unless something is wrapped in a big plastic box, with no way of looking at the works, they think that maybe there is something wrong with it and the 'whatever-it-is' needs to have its internals accessable to facilitate easy repair. Maybe they are not all mail-order junkies, after all they did give the RABBLE 65 an Honorable Mention, (in dispatches?).

David was there, as usual, ith doctor downer, (Apple that is), and treated us to some very fine graphic drawing and manipulation via a product called BIT STICK. This software/hardware package normally sells for around $900, but again as usual, if David can get inside something then he will reproduce it cheaper, (about $50). The package is a graphic drafting tool which allows fancy and complex graphics to be created on the screen with the aid of a list of commands that are accessed by manipulating a cursor with a joystick. The joystick is then positioned on the screen at the position the plot is required. Predifined characters/pictures can be dumped to the screen, any part filled with any colour, enlarged, reduced, moved, etc. etc. A very attractive and usuable lot indeed.

Paul Dodd, (in the guise of the now mild mannered George Nikolaidis), now has the CP/M boards working on both the Rabble and the OSI, at 6MHz, with psuedo 80 columns.

FOR SALE

C1P series II in case with power supply and 16K RAM. Also Titronics numeric keypad (matching). All goes OK but character generator is faulty. Dabug monitor, other bits and pieces and full documentation. $100
Contact E. Richardson,

SUPERBOARD series II, 12K memory with Dabug III, case and power supply, with software and documentation $250. Charlie ph.

C1P-MF, 51K memory, 1 MPI-B52 (double sided 2x40 tracks), modified 64x32, OS65D3.3 (standard) OS65D3.3 (modified to use both sides of the disk as one drive ie. 79 tracks), plug in Z80 card, New monitor ROM, New character generator (inverse ASCII), software:- CP/M 2.2, MBASIC, Wordstar, Modem 300Bd, Modem 4800Bd, etc. Price $800 ono

Contact Tony Browm,

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